IN THE CLAIMS

1. (Currently Amended) A device for automated composite lamination on a mandrel surface of a tool having a rotational axis, comprising:

a mechanical supporting structure, wherein the tool is moveable relative to said mechanical supporting structure; and

a plurality of material delivery heads supported by said mechanical supporting structure, wherein each of the material delivery heads are configured to provide a composite material having a width of at least 12 inches, wherein:

said mechanical supporting structure provides for movement of said plurality of material delivery heads relative to the mandrel surface; and

each of said plurality of material delivery heads is individually positionally adjustable, one relative to another of said plurality of material delivery heads, and relative to the mandrel surface during the automated composite lamination process; and

a computer numeric control (CNC) connected to all of said plurality of material delivery heads that operates each material delivery head so that a mandrel having a maximum thickness of at least 14 feet is covered with said composite material at a peak rate of at least 700 pounds per hour (lbs/hr) ~~at a utilization factor that increases delivery of composite material disproportionately for the number of material delivery heads in said plurality over that of a single material delivery head automated composite lamination device~~.

2. (Original) The device of claim 1, wherein said mechanical supporting structure comprises a ring surrounding said mandrel surface and said device further comprises a ring cradle, wherein:

said ring cradle supports said ring, and

said ring cradle moves along the direction of the rotational axis of the tool.

3. (Original) The device of claim 1, further comprising:

an arm mechanism connecting said at least one material delivery head to said mechanical supporting structure and providing motion of said at least one material delivery head relative to the mandrel surface.

4. (Original) The device of claim 1, further comprising:

a tail stock that holds the tool and provides for rotation of the tool about the rotational axis of the tool.

5. (Original) The device of claim 1, wherein at least one of said plurality of material delivery heads is based on a flat tape laying delivery head.

6. (Original) The device of claim 1, wherein at least one of said plurality of material delivery heads is based on a contour tape laying delivery head.

7. (Original) The device of claim 1, wherein said mechanical supporting structure comprises a ring surrounding said mandrel surface, said ring connected to at least one vertical support post.

8. (Original) The device of claim 1, further comprising a horizontal turntable that supports the tool so that the rotational axis of the tool is vertical.

9. (Original) The device of claim 1, further comprising at least one creel system mounted on said mechanical supporting structure, wherein said creel system provides material to at least one of said plurality of material delivery heads.

10. (Original) The device of claim 1, wherein at least one of said plurality of material delivery heads is a fiber placement head.

11. (Currently Amended) A device for automated composite lamination on a mandrel surface of a tool having an axis, comprising:

a mechanical supporting structure, wherein the tool is moveable and rotatable relative to said mechanical supporting structure; and

a plurality of material delivery heads supported by said mechanical supporting structure, wherein each of the material delivery heads are configured to provide a composite material having a width of at least 12 inches; and

a computer numerical control connected to said plurality of material delivery heads, wherein:

said mechanical supporting structure provides for axial translation of said plurality of material delivery heads simultaneously relative to the mandrel surface;

in operation, each one of said plurality of material delivery heads is positionally adjustable individually relative to all other of said plurality of material delivery heads; and

said computer numerical control operates each material delivery head at a speed ~~that increases a machine utilization factor of said device disproportionately to the number of said plurality of material delivery heads compared to a single head~~ so that a mandrel having a maximum thickness of at least 14 feet is covered with said composite material at a peak rate of at least 700 pounds per hour (lbs/hr) such that said device lays down at least 700 pounds per hour (lbs/hr) of composite material at peak rate.

12. (Original) The device of claim 11, wherein said mechanical supporting structure comprises a ring surrounding said mandrel surface, and said device further comprises a ring cradle, wherein:

said ring cradle supports said ring in a vertical orientation, and

said ring cradle moves along the direction of the axis of the tool to provide said axial translation of said plurality of material delivery heads simultaneously relative to the mandrel surface.

13. (Original) The device of claim 11, further comprising:

an arm mechanism connecting said at least one material delivery head to said mechanical supporting structure, wherein:

said arm mechanism provides motion of said at least one material delivery head relative to the mandrel surface; and

said arm mechanism provides an axial position adjustment of said at least one material delivery head relative to the mandrel surface.

14. (Original) The device of claim 11, further comprising:

a tail stock that holds the tool so that the axis of the tool is horizontal and provides for horizontal rotation of the tool about the axis.

15. (Original) The device of claim 11, wherein at least one of said plurality of material delivery heads is chosen from the group consisting of: flat tape laying delivery head, contour tape laying delivery head, fiber placement delivery head.

16. (Original) The device of claim 11, further comprising a horizontal turntable and wherein:

said mechanical supporting structure comprises a ring surrounding said mandrel surface,

said ring is connected to a vertical support post that provides vertical movement of said ring, and

said horizontal turntable supports the tool so that the axis of the tool is vertical.

17. (Original) The device of claim 11, further comprising at least one creel system mounted on said mechanical supporting structure, wherein said creel system provides material to at least one of said plurality of material delivery heads and said at least one of said plurality of material delivery heads is a fiber placement head.

18. (Original) The device of claim 11, wherein said plurality of material delivery heads is simultaneously controllable.

19. (Currently Amended) A device for automated composite lamination on a mandrel surface of a tool having a rotational axis, comprising:

a mechanical supporting structure, wherein the tool is moveable and rotatable relative to said mechanical supporting structure; and

a plurality of material delivery heads supported by said mechanical supporting structure and disposed surrounding the tool, wherein each of the material delivery heads are configured to provide a composite material having a width of at least 12 inches;

a numerical control, wherein:

said mechanical supporting structure provides for axial translation of said plurality of material delivery heads simultaneously relative to the mandrel surface;

each of said plurality of material delivery heads is individually adjustable with regard to its position relative to every other of said plurality of material delivery heads and relative to said mechanical supporting structure; and

said numerical control operates each head at a speed, material width, and material weight ~~that increases a composite material delivery rate of said device disproportionately to the number of said plurality of material delivery heads~~ so that a mandrel having a maximum thickness of at least 15 feet is covered with said composite material at a peak rate of at least 700 pounds per hour (lbs/hr) such that said device lays down at least 700 pounds per hour (lbs/hr) of composite material at peak rate.

20. (Original) The device of claim 19, further comprising:

an arm mechanism connecting said at least one material delivery head to said mechanical supporting structure, wherein:

said arm mechanism provides motion of said at least one material delivery head relative to the mandrel surface in a direction normal to the mandrel surface;

said arm mechanism provides rotation of said at least one material delivery head relative to the mandrel surface about an axis normal to the mandrel surface;

said arm mechanism provides a circumferential position adjustment of said at least one material delivery head in a hoop direction relative to the mandrel surface; and

said arm mechanism provides an axial position adjustment of said at least one material delivery head relative to the mandrel surface.

21. (Original) The device of claim 19, wherein said mechanical supporting structure comprises a ring surrounding said mandrel surface, and said device further comprises:

a tail stock that holds the tool so that the rotational axis of the tool is horizontal and provides for horizontal rotation of the tool; and

a ring cradle, wherein:

said ring cradle supports said ring in a vertical orientation,

said ring cradle moves along the direction of the rotational axis of the tool to provide said axial translation of said plurality of material delivery heads simultaneously relative to the mandrel surface,

at least one of said plurality of material delivery heads is a tape laying delivery head; and

said plurality of material delivery heads is capable of laying down at least 700 lbs/hr of composite material.

22. (Original) The device of claim 19, further comprising a horizontal turntable and at least one creel system, wherein:

said horizontal turntable supports the tool so that the rotational axis of the tool is vertical and rotates the tool about the rotational axis of the tool,

said mechanical supporting structure comprises a ring oriented horizontally and surrounding said mandrel surface,

said ring is connected to at least one vertical support post that provides vertical movement of said ring,

said at least one creel system is mounted on said ring,

said creel system provides material to at least one of said plurality of material delivery heads,

said at least one of said plurality of material delivery heads is a fiber placement head, and

said plurality of material delivery heads is capable of laying down at least 300 lbs/hr of composite material.

23. (Original) The device of claim 19, wherein each of said plurality of material delivery heads is individually controllable in coordination with said plurality of material delivery heads and in coordination with rotation of the mandrel surface of the tool.

24. (Previously Amended) An aircraft part manufacturing device for automated composite lamination on a mandrel surface of a tool having a rotational axis, comprising:

a mechanical supporting structure, wherein the tool is moveable and rotatable relative to said mechanical supporting structure; and

a plural number of material delivery heads supported by said mechanical supporting structure and disposed surrounding the tool, wherein each of the material delivery heads are configured to provide a composite material having a width of at least 12 inches, wherein, during automated composite lamination:

said mechanical supporting structure provides for axial translation of said plurality of material delivery heads relative to the mandrel surface; and

each of said plurality of material delivery heads is individually adjustable in position and orientation relative to every other of said plurality of material delivery heads and relative to said mechanical supporting structure; and

distinct arm mechanism corresponding and connecting each of said plurality of material delivery heads to said mechanical supporting structure, wherein:

each said arm mechanism provides individual motion, independently of all other arm mechanisms, of said corresponding material delivery head relative to the mandrel surface in a direction normal to the mandrel surface;

each said arm mechanism provides individual rotation, independently of all other arm mechanisms, of said corresponding material delivery head relative to the mandrel surface about an axis normal to the mandrel surface;

each said arm mechanism provides an individual circumferential position adjustment, independently of all other arm mechanisms, of said corresponding material delivery head in a hoop direction relative to the mandrel surface; and

each said arm mechanism provides an individual axial position adjustment, independently of all other arm mechanisms, of said corresponding material delivery head relative to the mandrel surface; and

a computer numerical control in communication with each of said plurality of material delivery heads, wherein:

said computer numerical control operates each head at a speed, material width, and material weight ~~that increases a utilization factor of each head so that said device operates at a machine utilization factor that increases a composite material delivery rate of said device disproportionately compared to the increase of the number of said plurality of material delivery heads over a single material delivery head~~ so that a mandrel having a diameter of at least 14 feet is covered with said composite material at a peak rate of at least 700 pounds per hour (lbs/hr) such that said device lays down at least 700 pounds per hour (lbs/hr) of composite material at peak rate.

25. (Currently Amended) An aircraft part manufacturing device for automated composite lamination on a mandrel surface of a tool having an axis, comprising:

means for supporting a plurality of material delivery heads wherein the tool is moveable relative to said plurality of material delivery heads, wherein each of the material delivery heads are configured to provide a composite material having a width of at least 12 inches;

means for providing for movement of said plurality of material delivery heads relative to the mandrel surface to cover substantially all of the mandrel surface with the composite material;

means for providing an individual position adjustment relative to every other of said plurality of material delivery heads and relative to the mandrel surface for each of said plurality of material delivery heads; and

means for operating said plurality of material delivery heads at a speed, material width, and material weight so that ~~said device operates at a machine utilization factor that increases a rate of delivery of composite material disproportionately beyond the increase of the number of material delivery heads of said plurality of material delivery heads over a single material delivery head~~ so that a mandrel having a diameter of at least [[15]] 14 feet is covered with said composite material at a peak rate of at least 700 pounds per hour (lbs/hr).

26. (Original) The device of claim 25, wherein said means for supporting said plurality of material delivery heads includes means for translating said plurality of material delivery heads in an axial direction relative to said tool.

27. (Previously Amended) The device of claim 25, wherein said means for providing an individual position adjustment comprises:

means for providing an axial position adjustment independently for each of said material delivery heads relative to the mandrel surface.

28. (Previously Amended) The device of claim 25, wherein said means for providing an individual position adjustment comprises:

means for providing a circumferential position adjustment independently for each of said material delivery heads in a hoop direction relative to the mandrel surface.

29. (Previously Amended) The device of claim 25, wherein said means for providing an individual position adjustment comprises:

means for providing a motion independently for each of said material delivery heads relative to the mandrel surface in a direction normal to the mandrel surface; and

means for providing a rotation independently for each of said material delivery heads relative to the mandrel surface about an axis normal to the mandrel surface.

30. (Previously Amended) The device of claim 25, wherein said means for providing an individual position adjustment comprises:

means for individually controlling each of said plurality of material delivery heads in independent coordination with said plurality of material delivery heads and independently in coordination with rotation of the mandrel surface of the tool.

31. (Currently Amended) A method for automated composite lamination on a mandrel surface of a tool having an axis, comprising steps of:

supporting a plurality of material delivery heads wherein the tool is moveable relative to said plurality of material delivery heads, wherein each of the material delivery heads are configured to provide a composite material having a width of at least 12 inches;

providing for movement of said plurality of material delivery heads relative to the mandrel surface;

providing for each of said plurality of material delivery heads an individual position adjustment relative to [[each]] the other ones of said plurality of material delivery heads and independently relative to the mandrel surface; and

operating each material delivery head so that a mandrel having a diameter of at least 14 feet is covered with said composite material at a peak rate of at least 700 pounds per hour (lbs/hr) ~~at a utilization factor so that said device operates at a machine utilization factor that increases a rate of delivery of composite material disproportionately beyond the increase of the number of material delivery heads of said plurality of material delivery heads over a single material delivery head~~.

32. (Original) The method of claim 31, wherein said step of providing for movement of said plurality of material delivery heads comprises:

translating said plurality of material delivery heads simultaneously in an axial direction relative to said tool.

33. (Previously Amended) The method of claim 31, wherein said step of providing an individual position adjustment comprises:

providing a circumferential position adjustment independently for each of said material delivery heads in a hoop direction relative to the mandrel surface; and

providing an axial position adjustment independently for each of said material delivery head relative to the mandrel surface.

34. (Previously Amended) The method of claim 31, wherein said step of providing an individual position adjustment comprises:

providing a motion independently for each of said material delivery heads relative to the mandrel surface in a direction normal to the mandrel surface;

providing a rotation independently for each of said material delivery heads relative to the mandrel surface about an axis normal to the mandrel surface.

35. (Previously Amended) The method of claim 31, wherein said step of providing an individual position adjustment comprises:

individually controlling each of said plurality of material delivery heads ~~independent~~ in coordination with said plurality of material delivery heads and independently in coordination with rotation of the mandrel surface of the tool.

36. (Currently Amended) The method of claim 31, further comprising steps of:

rotating the tool about a horizontal axis of rotation; and

delivering a composite material from said plurality of material delivery heads, wherein:

at least one of said plurality of material delivery heads is a tape laying machine~~; and~~

~~said plurality of material delivery heads lays down at least 700 lbs/hr of composite material at peak rate~~.

37. (Original) The method of claim 31, further comprising steps of:

rotating the tool about a horizontal axis of rotation; and

delivering a composite material from said plurality of material delivery heads, wherein:

at least one of said plurality of material delivery heads is a fiber placement head, and

said plurality of material delivery heads lays down at least 300 lbs/hr of composite material at peak rate.